WHAT IS CLAIMED IS

1. A semiconductor device comprising:

a semiconductor substrate of a first conduction type;

a buried semiconductor layer of a second conduction type formed in a first region of the semiconductor substrate, spaced from a surface of the semiconductor substrate;

a semiconductor region of the second conduction type extending from the surface of the semiconductor substrate to a peripheral portion of the buried semiconductor layer; and

a semiconductor region of the first conduction type formed in the semiconductor substrate surrounded by the buried semiconductor layer and the semiconductor region of the second conduction type.

2. A semiconductor device according to claim 1, further comprising

a first semiconductor element formed in the first conduction type region; and

a second semiconductor element formed in a second region different from the first region of the semiconductor substrate,

the first conduction type semiconductor region being connected to a first potential,

the second region of the semiconductor substrate being connected to a second potential different from the first

potential.

3. A semiconductor device according to claim 2, wherein

the second conduction type semiconductor region is extended over a third region adjacent to the first region of the semiconductor substrate;

the semiconductor device further comprises a third semiconductor element formed in the third region of the second conduction type semiconductor region; and

the second conduction type semiconductor region is connected to a third potential different at least the first potential or the second potential.

4. A semiconductor device according to claim 3, further comprising

a well of the first conduction type formed in a fourth region in the third region; and

a fourth semiconductor element formed in the first conduction type well, and

the first conduction type well being connected to a fourth potential different from at least the first potential.

5. A semiconductor device according to claim 2, wherein

the first semiconductor element and/or the second semiconductor element is a memory cell.

6. A semiconductor device according to claim 3,

wherein

the first semiconductor element and~~/or~~ the second semiconductor element is a memory cell.

7. A semiconductor device according to claim 4, wherein

the first semiconductor element and~~/or~~ the second semiconductor element is a memory cell.

8. A method for fabricating a semiconductor device comprising:

a buried semiconductor layer forming step of implanting at first energy impurity ions of a second conduction type in a first region of a semiconductor substrate of a first conduction type to form a buried semiconductor layer of the second conduction type in the semiconductor substrate, spaced from a surface of the semiconductor substrate; and

a second conduction type semiconductor region forming step of implanting impurity ions of the second conduction type in a peripheral portion of the first region of the semiconductor device at second energy which is lower than the first energy to form a semiconductor region of the second conduction type extended to the buried semiconductor layer.

9. A method for fabricating a semiconductor device comprising:

a buried semiconductor layer forming step of

implanting at first energy impurity ions of a second conduction type in a first region of a first conduction type semiconductor substrate to form a buried semiconductor layer of the second conduction type in the semiconductor substrate, spaced from a surface of the semiconductor substrate;

a second conduction type semiconductor region forming step of implanting impurity ions of the second conduction type in a peripheral portion of the first region of the semiconductor device at second energy which is lower than the first energy to form a semiconductor region of the second conduction type in a region which is deep to a prescribed level from the surface of the semiconductor substrate; and

a heat treatment step of performing a heat treatment to diffuse the impurity ions in the buried semiconductor layer and in the second conduction type semiconductor region to connect the buried semiconductor layer and the second conduction type semiconductor region with each other.

10. A method for fabricating a semiconductor device comprising:

a second conduction type semiconductor region forming step of implanting impurity ions of a second conduction type at first energy in a peripheral portion of a first region of a semiconductor substrate of a first conduction

type to form a semiconductor region of the second conduction type in a region which is deep to a prescribed level from a surface of the semiconductor substrate;

a heat treatment step of performing a heat treatment to diffuse the impurity ions in the second conduction type semiconductor region; and

a buried semiconductor layer forming step of implanting impurity ions of the second conduction type in the first region of the semiconductor substrate at second energy which is higher than the first energy to form a buried semiconductor layer of the second conduction type connected to the second conduction type semiconductor region, spaced from the surface of the semiconductor substrate.

11. A method for fabricating a semiconductor device comprising:

a second conduction type semiconductor region forming step of implanting impurity ions of a second conduction type at first energy in a peripheral portion of a first region of a semiconductor substrate of a first conduction type to form a semiconductor region of the second conduction type in a region which is deep to a prescribed level from a surface of the semiconductor substrate;

a buried semiconductor layer forming step of implanting impurity ions of the second conduction type in the first region of the semiconductor substrate at a second

energy which is higher than the first energy to form a buried semiconductor layer of the second conduction type spaced form the surface of the semiconductor substrate; and

a heat treatment step of performing a heat treatment to diffuse the impurity ions in the second conduction type semiconductor region and in the buried semiconductor layer to connect the second conduction type semiconductor region and the buried semiconductor layer with each other.

12. A method for fabricating a semiconductor device comprising:

a second conduction type semiconductor region forming step of implanting impurity ions of a second conduction type at first energy in a peripheral portion of a first region of a semiconductor substrate of a first conduction type at first energy to form a semiconductor region of the second conduction type, then implanting impurity ions of the second conduction type in the peripheral portion at second energy which is higher than the first energy to form the second conduction type semiconductor region deeper from the surface of the semiconductor substrate; and

a buried semiconductor layer forming step of implanting impurity ions of the second conduction type in the first region of the semiconductor substrate at third energy which is higher than the second energy to form a buried semiconductor layer of the second conduction type connected to the second conduction type semiconductor

region, spaced from the surface of the semiconductor substrate.

13. A method for fabricating a semiconductor device according to claim 8, wherein

in the second conduction type semiconductor region forming step, a semiconductor region of the second conduction type is also formed in a second region which is adjacent to the first region of the semiconductor substrate.

14. A method for fabricating a semiconductor device according to claim 9, wherein

in the second conduction type semiconductor region forming step, a semiconductor region of the second conduction type is also formed in a second region which is adjacent to the first region of the semiconductor substrate.

15. A method for fabricating a semiconductor device according to claim 10, wherein

in the second conduction type semiconductor region forming step, a semiconductor region of the second conduction type is also formed in a second region which is adjacent to the first region of the semiconductor substrate.

16. A method for fabricating a semiconductor device according to claim 11, wherein

in the second conduction type semiconductor region

forming step, a semiconductor region of the second conduction type is also formed in a second region which is adjacent to the first region of the semiconductor substrate.

17. A method for fabricating a semiconductor device according to claim 12, wherein

in the second conduction type semiconductor region forming step, a semiconductor region of the second conduction type is also formed in a second region which is adjacent to the first region of the semiconductor substrate.

18. A method for fabricating a semiconductor device according to claim 13, further comprising

a well forming step of implanting a high concentration of impurity ions of the first conduction type in a prescribed region of the second region to form a well of the first conduction type.

19. A method for fabricating a semiconductor device according to claim 14, further comprising

a well forming step of implanting a high concentration of impurity ions of the first conduction type in a prescribed region of the second region to form a well of the first conduction type.

20. A method for fabricating a semiconductor device according to claim 15, further comprising

a well forming step of implanting a high concentration

of impurity ions of the first conduction type in a prescribed region of the second region to form a well of the first conduction type.

21. A method for fabricating a semiconductor device according to claim 16, further comprising

a well forming step of implanting a high concentration of impurity ions of the first conduction type in a prescribed region of the second region to form a well of the first conduction type.

22. A method for fabricating a semiconductor device according to claim 17, further comprising

a well forming step of implanting a high concentration of impurity ions of the first conduction type in a prescribed region of the second region to form a well of the first conduction type.